Headquarters U.S. Air Force

Integrity - Service - Excellence

NITF and Multi-Image Scenes

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February 5, 2003

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Terminology

- **Scene: An imaging sensor operation performed in response to an IMINT collection request**
  - **Types of Collection Requests: Point Target, Line of Communication (LOC), Directed Search Area (DSA)**
- **Scene Number: A designator assigned in support of TPED**
  - **Scene number is used to associate a NITF file (or files) with a particular collection request in the mission plan (i.e. target deck)**
- **Scene Segment Identifier: A designator assigned in support of file management, image screening, and exploitation**
  - **Segment ID is used to indicate the geometric layout (or time sequence relationship) among particular NITF files within a scene**

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Problem Statement

- Global Hawk EO/IR, SHARP EO/IR, ASARS-2A produce multiple NITF files in response to a single collection request
  - Scene number is the same for all NITF files belonging to the collection request that generated the scene
  - Scene number is stored in the image sub-header or SDE
    - Location (and presence) varies among sensors (and needs to be standardized)
    - Global Hawk will be using combined Flight_No, Op_Num fields in AIMID Support Data Element to hold scene number
- Handling of scenes which are “collections of images” is not routine within DCGS (e.g. DTS or CIP/IESS/IPL)
  - Segment Identifier varies among sensor types/developers (and needs to be standardized)
  - Usages include frame/tile; swath; segment
  - Repetitive imaging operations produce a time sequence of scenes (in response to a single collection request); Global Hawk differentiates repeated scenes via segment number; standardization is needed.

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"Solution Set" Members Include:

- CIP/IESS/IPL workflow issues related to the handling and display of multi-image scenes are being worked via meetings and telecons. These efforts include:
  - The "interim" tactical file name convention
  - CIP mosaicing approaches
- Geoposition accuracy issues related to the handling and extraction of precision target coordinates from multi-image scenes are being worked. Efforts include:
  - Framing sensor and geolocation meetings and telecons
  - Tactical Sensor Model Requirements Definition and Application Program Interface Definition effort (by ASC/RA)
  - Enhanced capabilities from electronic light table (ELT) vendors
  - Screening demonstration using DTS test bed (Global Hawk SPO & DGCS SPO)

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Multi-Image Scene Recommendations

- File management is more difficult when a single collection request results in hundreds (or thousands) of associated NITF files.
- Recommendations:
  - File naming convention allows operating system directory “tools” to manipulate groups of files associated with a scene (e.g. using wildcard characters)
  - Individual NITF files (associated with a scene) can be “repackaged” within a single NITF file “binder”
    - A new SDE “multi-image index” is needed to make extraction of the original files efficient (via segment_swath_frame referencing)
    - A reduced resolution mosaic image can be provided to support visual (or algorithmic) selection from within the multi-image set (via segment_swath_frame referencing

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Multi-Image Scene Recommendations (cont.)

- Usual DCGS workflow at screening station is to display a large image and for the screener to select the target area of interest and hand off an image chip (e.g. using NITF ICHIPB) to the exploitation station. For a multi-image scene, the target area of interest can encompass multiple NITF files.
- Recommendation
  - Provide multi-image display capability at screener. Rather than chipping, the screener “nominates” NITF files for hand off to the exploitation station.
- Alternative
  - Pre-process the multi-image scene into a single image (mosaic), then chip. NOTE: Unless great effort is expended producing this mosaic, geolocation and mensuration utility will be eroded relative to the original frames.

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Multi-Image Scene Recommendations (cont.)

- **Usual DCGS workflow at exploitation station is to display a full NITF image or image chip (e.g. using ICHIPB). For a multi-image scene, the target area of interest (nominated by the screener) can encompass multiple NITF files.**
- **Recommendation**
  - **Utilize multi-image display capability at exploitation station. NOTE: VITec ELT has demonstrated ability to display Global Hawk Spot images comprised of 140 individual NITF files. Original support data is maintained with each image. Typical number of files "nominated" by screener will be much less than 140.**

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Back Up Material

- **TPED Uses of Scene Number**
  - **Tasking: Mission Planning, Sensor Collect Scheduling**
  - **Processing: On-board or ground operations data management**
  - **Exploitation: Screening, mosaicing**
  - **Dissemination: Routing files; matching products to requestor; archiving**